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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.
08/913,518	11/04/97	DEBALME	J 1247-709-3VF

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EXAMINER

AFTERGUT, J

ART UNIT	PAPER NUMBER
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1733

DATE MAILED: 12/13/99

16

Please find below and/or attached an Office communication concerning this application or proceeding.

Commissioner of Patents and Trademarks

Office Action Summary

Application No.
08/913,518

Applicant(s)
DEBALME ET AL

Examiner
Jeff H. Aftergut

Group Art Unit
1733



☒ Responsive to communication(s) filed on Nov 3, 1999

☐ This action is **FINAL**.

☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11; 453 O.G. 213.

A shortened statutory period for response to this action is set to expire THREE month(s), or thirty days, whichever is longer, from the mailing date of this communication. Failure to respond within the period for response will cause the application to become abandoned. (35 U.S.C. § 133). Extensions of time may be obtained under the provisions of 37 CFR 1.136(a).

Disposition of Claims

☒ Claim(s) 1 and 5-14 is/are pending in the application.

Of the above, claim(s) _____ is/are withdrawn from consideration.

☐ Claim(s) _____ is/are allowed.

☒ Claim(s) 1 and 5-14 is/are rejected.

☐ Claim(s) _____ is/are objected to.

☐ Claims _____ are subject to restriction or election requirement.

Application Papers

☐ See the attached Notice of Draftsperson's Patent Drawing Review, PTO-948.

☐ The drawing(s) filed on _____ is/are objected to by the Examiner.

☐ The proposed drawing correction, filed on _____ is ☐ approved ☐ disapproved.

☐ The specification is objected to by the Examiner.

☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. § 119

☐ Acknowledgement is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d).

☐ All ☐ Some* ☐ None of the CERTIFIED copies of the priority documents have been

☐ received.

☐ received in Application No. (Series Code/Serial Number) _____.

☐ received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

*Certified copies not received: _____

☐ Acknowledgement is made of a claim for domestic priority under 35 U.S.C. § 119(e).

Attachment(s)

☒ Notice of References Cited, PTO-892

☐ Information Disclosure Statement(s), PTO-1449, Paper No(s). _____

☐ Interview Summary, PTO-413

☐ Notice of Draftsperson's Patent Drawing Review, PTO-948

☐ Notice of Informal Patent Application, PTO-152

--- SEE OFFICE ACTION ON THE FOLLOWING PAGES ---

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Claim Rejections - 35 USC § 112

1. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

2. Claims 1, 5-12 are rejected under 35 U.S.C. 112, first paragraph, as containing subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. In claim 1, line 5, the applicant has added to the claim that one of the layers is made up of glass fibers which were commingled with thermoplastic fibers where the fibers were "loose". The original disclosure defined the placement of the fibers upon a conveyor or a fabric and disclosed that the layer so deposited was in the form of chopped or continuous fibers in the form of a mat. There is no description in the specification which defined that the fibers were laid down "loose" which applicant in the response equated to not including nonwoven mats which were interentangled or batts which were interentangled. Clearly, the original disclosure did not include discussion of the specific nature of the nonwoven material deposited upon the conveyor or fabric such that it was clear that applicant had in their possession the use of loose fibers at the time the application was filed (which was suggested by applicant in the response to mean non-interentangled or that there was no means holding the threads together).

3. The following is a quotation of the second paragraph of 35 U.S.C. 112:

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The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

4. Claims 1 and 5-12 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

The applicant has added to the claims that the fibers of one of the layers were "loose", however the exact meaning of the term "loose" in the claim is not clear. The disclosure described the application of fibers in the form of chopped fibers or continuous fibers where the fibers formed a mat, however the response by applicant dated 9-30-99 appeared to suggest that any kind of attachment or cohesive layers would have been excluded from "loose" fibers as claimed (despite the fact that the disclosure described the same as "mats" and such nonwoven "mats" clearly were assembled together in some manner (where there was some degree of "attachment" between the fibers). The applicant is advised that because the relative term was not described in the original disclosure (as noted above) the exact scope of the meaning of the term in the claim cannot be ascertained and thus the claim is not clear and concise.

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are

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such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

6. Claims 1 and 5-14 are rejected under 35 U.S.C. 103(a) as being unpatentable over either one of Murphy or U.K. 2093768 (newly cited) further taken with O'Connor, E.P. 408,898 and either one of Li et al or Koba et al.

Murphy taught a process for forming a composite preform which included the steps of laminating a woven fiber reinforced ply to a nonwoven fiber reinforced layer wherein each of the layers would have included both thermoplastic filaments and reinforcing filaments. The thermoplastic filaments were melted in the lamination operation wherein heat and pressure were applied to the layers with heated pressure rollers. The reference taught that the composites would have included 2-25% thermoplastic in the plies. After the application of heat and compaction, the layers were cooled. The applicant is more specifically referred to column 5, lines 7-8 and column 6, lines 26-30 for a discussion of the use of woven or nonwoven layers in the stack. The reference taught the amounts of thermoplastic and/or reinforcing fibers in the composite preforms, see column 7, lines 51-column 8, line 22. The reference taught that heated pressure rollers would have been used to apply heat and pressure to laminate the plies together, see column 8, lines 44-49, column 9, lines 39-42. The reference taught that any number of woven and nonwoven layers could be assembled and bonded together with heat and pressure (followed by cooling) in order to form the desired composite preform, see column 9, lines 1-18. The reference taught the inclusion of thermoplastic filaments within the weave and nonwoven layers (as well as the

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reinforcing filament therein), however the reference failed to express that the thermoplastic filament and the reinforcing filament would have been commingled and that the woven and/or nonwoven layers would have been formed from the commingled filaments of the thermoplastic and reinforcing filaments. The reference suggested that heated pressure rollers would have been useful for application of heat and pressure and seemed to infer that the operation of forming the preform would have been a continuous one (why would one use heated rollers to apply heat and pressure to a discrete stack of layers). The reference failed to suggest that the layers would have been disposed on a conveyor to convey the same to the heating and pressing operation.

U.K. '768 taught that it was known at the time the invention was made to make a fiber reinforced thermoplastic composite by forming a fabric from thermoplastic filaments and reinforcing filaments and applying heat and pressure to the same in order to form the composite article. The reference taught that plural layers of fabric would have been plied one on top of the other (presumably with the reinforcement running in various layers in different directions) in order to form a composite product which provided the desired degree of strength and reinforcement as dictated by the properties one wished to attain. The applicant is referred to the abstract of the reference, page 1, lines 9-23. Note that the fabrics used can include up to 85% reinforcement therein, see page 1, lines 45-48. The reference suggested that a press would have been used to consolidate the plies. The reference failed to teach the use of commingled filaments of the reinforcing fibers and the thermoplastic fibers and additionally failed to suggest that one would

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have incorporated into the assembly a nonwoven layer which included chopped or continuous fibers.

However, as taught by O'Connor, one skilled in the art would have employed commingled filaments of thermoplastic and reinforcing filaments in order to ensure adequate contact between the thermoplastic and reinforcing filaments (and better wetting of the reinforcing filaments when heat and pressure was applied) to form woven and nonwoven laminates of reinforcing filaments and thermoplastic filaments. More specifically, O'Connor suggested that by commingling the thermoplastic filaments with the reinforcing filaments one was able to attain intimate contact between the thermoplastic fibers which form the matrix and the reinforcing fibers and a more even and uniform impregnation of the reinforcing filaments. The applicant is referred to column 1, lines 27-31, column 1, lines 45-57. The reference taught that commingling of the thermoplastic filaments and the reinforcing filaments would have been performed in the manufacture of both nonwoven and woven fiber layers. The reference taught that in the formation of a nonwoven with the commingled yarns one would have chopped the same and deposited the short fibers together to form a mat or batt. O'Connor taught that as an alternative to the chopped bat of commingled fibers, a fabric formed from the commingled yarns would have been suitable and additionally a fabric formed from yarns where one yarn type used was a thermoplastic yarn and the other yarn type used was a reinforcing yarn which was woven together into a fabric (note that this is similar in nature to the fabrics of U.K. '768). The reference suggested that one would have desired intimate contact between the reinforcing filaments and the thermoplastic filaments and that one

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useful way for achieving the same would have been to commingle the filaments of thermoplastic and reinforcing materials together and utilize the same to either form a woven fabric or a nonwoven wherein subsequent to the formation one would have applied heat and pressure to the same in order to form a composite article. Because it would have ensured a better impregnation with the matrix, it would have been within the purview of the ordinary artisan to employ the mingling techniques of O'Connor in the process of Murphy. Additionally, the use of a nonwoven fabric instead of a woven fabric as an alternative form of material for use in forming a composite thermoplastic article was clearly envisioned by O'Connor and the use of such a functionally equivalent alternate expedient for the fabrics of U.K. '768 would have been within the purview of the ordinary artisan (it is well settled that where, as here, two equivalents were known for their same desired function, an express suggestion of the substitution of one for the other is not needed to render such substitution obvious, see In re Fout, 213 USPQ 532, In re Siebentritt, 152 USPQ 618). The combination, nonetheless, failed to suggest that the layers would have been disposed upon a conveyor.

However, in the art of laminating a woven layer to a nonwoven layer where one of the layers included thermoplastic filaments therein (and the thermoplastic was heated and melted to bond the layers together), it was known at the time the invention was made to employ a double band press to form the laminate as evidenced by E.P. '896. More specifically, E.P. '896 suggested that one skilled in the art would have incorporated a double band press to form the laminate, see column 2, lines 35-37. Note that the reference to Murphy suggested that one would have

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employed a heated pressing roller to apply heat and pressure to the material to form the laminate. The reference to U.K. '768 suggested that one would have utilized a press to form and consolidate the material. The reference to E.P. '896 suggested that those skilled in the art were well aware of the use of a conveying mechanism to feed the material which would have included a double belt press or a calender system (a calender system would have been heated pressing rolls). The reference failed to depict the double belt press structure in terms of what the same would have entailed.

However, in the art of forming fiber reinforced thermoplastic composites, it was known at the time the invention was made to employ a double band press in order to convey as well as press a resin into the reinforcing fibers in the manufacture of a fiber reinforced thermoplastic composite article. Additionally, the use of a single endless belt where one employed pressing rollers to apply heat and pressure to the thermoplastic resin in order to enhance impregnation was also known as evidenced by either one of Koba et al or Li et al. More specifically, Koba et al. employed bands 14 and 15 for conveying the reinforcing fibers and matrix material for impregnation where the matrix material employed was a thermoplastic material. The reference taught the use of heating rollers 17, 18, 19, 20, 22, and 23 (for example) for applying heat and pressure to the material in order to impregnate the reinforcing filaments with the thermoplastic matrix. The reference additionally included a cooling section 26 which is more clearly depicted in Figure 7 which also included pressing chilled rollers which were used to solidify the matrix material once the same was impregnated into the fibers. The reference clearly suggested to one

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skilled in the art that when heated pressing rollers were used to impregnate a thermoplastic matrix material into reinforcing fibers one would have utilized a conveyor onto which the reinforcing material was disposed (in this case the double band belts. Regarding the reference to Li et al. The reference suggested that one would have utilized an endless conveyor onto which the reinforcing material with the matrix material would have been disposed. The reference taught plural heating pressing rollers 53 and 54 as well as plural pressing and cooled rollers 56 and 57 which were used in the manufacture in order to press the matrix of thermoplastic resin evenly into the fibers of the prepreg material. The reference taught the use of an endless conveyor 30 for feeding the material through the heating and cooling operations. Certainly, such would have been useful in the operation of Murphy where the use of pressure applying rollers (which were heated) was suggested for application of heat and pressure to flow the thermoplastic fibers in the nonwoven and woven layers in order to bond the two together. This is particularly true in light of the teachings of E.P. '896 because the use of a double band press or calendering operation was suggested as useful for the application of heat and pressure when working with such "dry" fabric materials. It would have been obvious to one of ordinary skill in the art at the time the invention was made to utilize the conveyor and heat and pressure application means of either one of Koba et al or Li et al in the manufacture of a fiber reinforced thermoplastic resin impregnated composite which was made up of plural dry fabric layers (whether woven or nonwoven) as such was suggested as having been useful with such "dry" fabrics for melting the matrix therein as suggested by E.P. '896 wherein the pressing devices would have applied heat and pressure to

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consolidate the dry fabrics of Murphy or U.K. 2093768 wherein the use of a nonwoven was a functional equivalent to the use of a fabric and wherein such nonwoven and woven fabrics would have been formed from commingled fibers in order to achieve intimate contact between the matrix material and the reinforcement as suggested by O'Connor.

With regard to claim 5, note that the reference to Murphy suggested the use of nonwovens in the form of mats or batts and that the reference to O'Connor suggested that the fibers were chopped when making a nonwoven. Regarding claim 6, note that the weaves of Murphy and O'Connor were formed of continuous length filaments and that such would have included commingled filaments only (for more intimate contact). Note additionally that Murphy suggested the formation of mats and/or batts and the ordinary artisan was well aware that such structures conventionally included continuous threads in the production of the same (a matt of batt formed of fibers included continuous filaments and such is taken as conventional in the art of nonwovens). Nonwoven mats formed from continuous filaments were conventional in the art and such would certainly have been within the purview of the ordinary artisan in light of the teachings of Murphy. Regarding claim 7, note that Murphy suggested the application of heat and pressure to consolidate the layers followed by cooling of the same as did O'Connor and U.K. '768. Regarding claims 8-10, as previously noted in paper no. 7, the particular number of layers and the order in which they were stacked would have been within the purview of the ordinary artisan depending upon the desired thickness and strengths of the final composite article. This is additionally reinforced by U.K. '768. Note that Murphy suggested that the number of layers would have been

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left up to those skilled in the art and that different layers would have been provided with different amounts of thermoplastic in order to achieve none but the expected results. Regarding claim 11, note that in Murphy as depicted the layers appear to have the same width. Regarding claim 12, note that Murphy suggested the specified amount of reinforcement in the composite article. U.K. '768 clearly suggested that the amount of reinforcement included would have been determined depending upon the desired end product and certainly would have included the specified amounts dictated by the claims. Regarding claim 13, note that the reference to O'Connor suggested the use of a chopping means and that as set out in paper no. 7, one skilled in the art would have understood that a spool would have been used to supply a fabric of material and such is taken as conventional in the art. The use of two spools which were on the same support is taken as conventional as well as one skilled in the art would have understood such would have ensured an endless supply of fabric material (when one spool ran out, the other spool would have been used in its place and the use of plural spools in the fashion is well known and conventional in the art of splicing to feed an endless supply of material in a converting operation). Note that the reference to Koba et al suggested that one would have utilized a double band press. The use of a double band press was additionally taught by E.P. '896. The applicant is additionally advised that one skilled in the art would have understood that a preheater would have been utilized in combination with a double band press and such is taken as conventional in the art. Regarding claim 14, see the comments regarding claim 13 and note that Murphy suggested the formation of multiple layers and such would certainly have included multiple supply devices. Regarding both claims 13 and 14,

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the use of a guillotine to cut the material downstream of the press would have been obvious as such would have been used to provide composite material of a suitable size and the use of the same is taken as conventional in the art.

Response to Arguments

7. Applicant's arguments filed 9-30-99 have been fully considered but they are not persuasive.

The applicant takes the position that the references failed to teach the lamination of plural layers wherein one employed layers of commingled fibers in the form of a nonwoven mat of chopped fibers. The reference to Murphy clearly envisioned the incorporation of nonwoven layers disposed between the fabric layers, see column 5, lines 7-8 column 6, lines 26-34. The newly cited reference to U.K. '768 does indeed fail to express the incorporation of nonwoven layers in the plies, however the reference to O'Connor clearly suggested that the form of the plies would have included fabrics such as those taught by U.K. '768 as well as nonwovens formed from commingled yarns which were cut to staple length and formed into batts, see column 3, lines 34-61. The particular number of layers as well as the amount of reinforcing fibers therein and the types of fabrics (woven or nonwoven) would have been determined depending upon the final properties desired in the finished product as suggested by U.K. '768.

Regarding the limitations relating to the use of loose fibers, the applicant is advised that the references suggested the formation fo nonwovens and that a nonwoven would have had the


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fibers disposed loosely relative to a woven fabric. The term in a relative term and the exact scope of the same is unclear based upon the application as originally filed. It is believed that the incorporation of a nonwoven in the laminate reads on the claim as presented.

Conclusion

8. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jeff Aftergut whose telephone number is (703) 308-2069.

JHA
December 8, 1999


JEFF AFTERGUT
PRIMARY EXAMINER
ART UNIT 1733